

## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau(43) International Publication Date  
18 January 2001 (18.01.2001)

PCT

(10) International Publication Number  
WO 01/04651 A1

(51) International Patent Classification?: G01R 31/04 (24) Agent: LUNDQUIST, Arne, Oxhögs 1-9, S-139 50 Västerås (SE)

(21) International Application Number: PCT/SE0001462

(81) Designated States (national): CA, US

(22) International Filing Date: 8 July 2000 (08.07.2000)

(84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE)

(25) Filing Language: Swedish

## Published:

-- With international search report.

(26) Publication Language: English

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

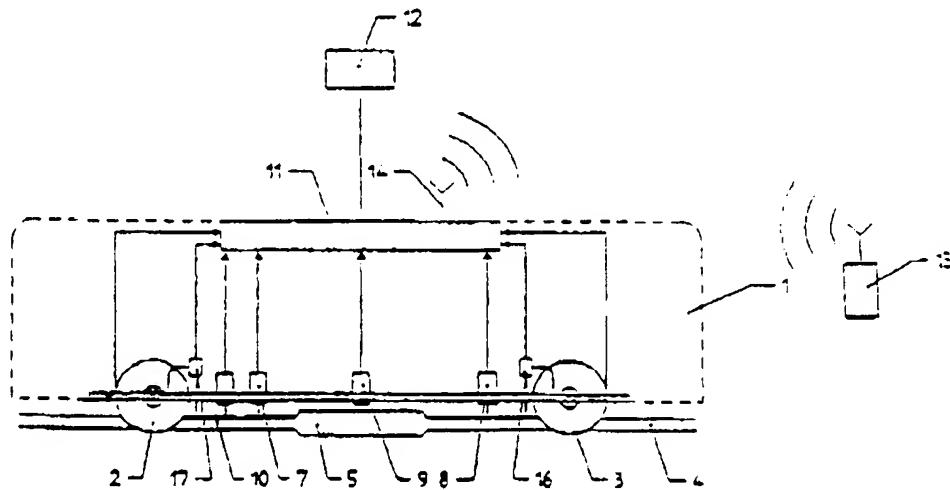
(30) Priority Data: 9902664-3 9 July 1999 (09.07.1999) SF

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(54) Title: A DEVICE FOR THE AUTOMATIC CONTROL OF JOINTS IN ELECTRICAL HIGH VOLTAGE LINES



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(57) Abstract: A device for the automatic control of joints (5) in electrical high voltage lines is disclosed. It comprises a first support (1), a first wheel (2) for lying on a line (4), a driving means for driving of said first wheel (2), at least one second wheel (3) for lying on said line (4), a measurement unit (11) in contact with means for the measurement of physical data at said joint. These means comprise at least one pointed element (7, 8, 9) for electrical contact with the line (4). The device is especially characterized in that at least one wheel (2, 3) is provided, electrically connected to said measurement unit (11).

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figure 1 schematically shows a view of one embodiment of the device according to the invention,

figure 2 shows a section of a wheel, provided with a glide contact, whilst

figure 3 schematically shows a view of part of the device, provided with a swingable holder-on.

In figure 1 a schematically indicated support is denoted by 1, a first wheel by 2, a second wheel by 3 and a line, against which these wheels lie, by 4. At least one of these wheels is provided with a driving device, which is not shown. The line 4 is provided with a joint 5. Both wheels are provided with a glide contact 6, according to figure 2. The wheels are such designed, as to the outer diameter D, the inner diameter d, the outer width b, the inner free width e, the fillet radius r and the opening angle  $\alpha$ , that both the mechanical and electric demands are fulfilled. The inclined inner sides of the wheel flanges are suitably provided with structured surfaces, e.g. in the form of groovings or other surface form, in order to warrant good electrical contact with the line, when the wheels are used for feeding current, and also when they operate in the same way as the first, second and third pointed element, which are marked by 7, 8 and 9. They are prestressed by springs for lying with good electrical contact with the line 4 and the joint 5. A measurement pair of tongs 10 is provided for measurement of the amperage in the line 4. The wheels via glide contacts, the pointed elements and the measurement pair of tongs are all connected to an electric measurement unit 11, which is also connected to an electric current feeding unit 12. The measurement unit 11 may be connected to a control station 13 via an optical fiber, an electric line or wireless via an antenna 14, as is indicated in figure 1. The pointed elements are, as is mentioned, provided for electrical contact with the line and joint, respectively. They also measure the temperature and transfer data of same to the measurement unit 11. The wheels may be used as pointed elements as well as for current feed. In figure 3 there is shown a holder-on, swingable in relationship to the support 1, which holder-on is provided to press the wheel from below, when the wheel has come to lie at the line 4, to warrant electrical contact. The holder-on can also be used for transfer, together with wheel 2, current to line and joint 4, 5 in order to get better current distribution in these.

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**A device for the automatic control of joints in electrical high voltage lines**

The present invention relates to a device for the automatic control of joints in electrical high voltage lines, comprising a first support, a first wheel for lying on a line, a driving means for driving of said first wheel, at least one second wheel for lying on said line, a measurement unit in contact with means for the measurement of physical data at said joint, comprising at least one pointed element for electrical contact with the line.

Such devices are known, e.g. from the International Patent Application PCT/SE93/00666, which discloses a device intended to be located on a line for electrical high voltage by a crane or a helicopter. This device comprises a number of means for remotely controlled, automatic measurement of physical data at a joint in the line. The device shows, however, some limitations as to the measurement methods, as only pointed elements are provided for electrical measurements. There is a demand for a device of the art mentioned introductory, which enables more active measurement methods. According to the invention, such a device is primarily characterized in that at least one wheel is provided, electrically connected to said measurement unit. In one advantageous embodiment of the device at least two wheels are provided, electrically connected to said measurement unit, whereas a means for feeding current is provided to feed an electrical current from the first wheel to the second wheel through the line. In one alternative embodiment of the device the means for measurement of physical data in the form of at least one pointed element (7,8,9) also comprise at least one wheel (2,3). In one advantageous embodiment of the device it comprises a holder-on, journaled in the support, intended to be swung up below the line to increase the pressure of the wheel against same.

In the following the invention shall be described more in detail, reference being made to the three enclosed figures, of which:

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The device is lifted to the actual line and shall first be positioned. For positioning of the device, including the joint, that shall be measured, and measuring the diameter of the line and the joint respectively, position givers in the form of distance gauges, are used, preferably of the laser type. In figure 1 they are marked by 16 and 17. Furthermore here one not shown rotational giver is used for measurement of the rotation of the driving wheel or the driving wheels, i.e. traveled length on the line. Principally the positioning is carried out such that one operator drives the device forward on the line towards the actual joint. If, according to figure 1, the device is driven to the right, the position giver 17 will be used for indicating when the left limit of the joint is achieved. The device is backed, and the length traveled is indicated by the rotational giver. The position 16 giver indicates when it has reached the right limit. By the aid of indicated data the device is driven such that the joint will lie centrally within the device. The device may now be used, after positioning on the line for electrical high voltage, the joint of which shall be controlled, in different ways according to the following:

#### Alternative A

The measurement unit 11, wheel 2, line 4 with joint 5 and wheel 3 form a current circuit, within which a current of a known amperage is made to circulate. The voltage drop between at least two measurement points, wheel 2, pointed elements 7,8,9 and wheel 3 is measured, as well as the temperature at the pointed element 7,8 and 9.

#### Alternative B

The same current circuit as in alternative A is arranged, and a current with per se not known amperage is made to circulate in same, and the amperage in line 4 is measured with the measurement pair of tongs 10. Otherwise the same measurements are carried out as according to alternative A.

#### Alternative C

In this case the line 4 is fed with a current of known amperage. The voltage drop is measured between at least two of the measurement points, that are formed by the two wheels via their glide contacts and the pointed elements 7,8 and 9. Otherwise the measurements are carried out according to alternative A

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**Alternative D**

The line 4 is here fed with a current of a not known amperage. This is measured by the measurement pair of tongs 10, and otherwise it is measured according to alternative C.

**Alternative E**

In this case the line 4 is fed with a current of not known amperage. This is measured by the measurement pair of tongs 10 and the voltage drop is measured between a wheel via its glide contact and the pointed elements 7,8 and 9. Furthermore the temperature is measured at the pointed elements 7,8 and 9.

Within the scope of the invention, the device may be formed in several ways. Thus, the symmetry plane of the wheels, parallel to the line 4, must not lie in the same plane. The means for physical measurement may also include such ones for the measurement in three dimensions of position in relationship to the line and the joint. The pointed elements may be placed above, at the side of or below the line 4, also outside of the wheels. The pointed elements may be arranged such, that they admit the measurement of the form of the joint and bending, respectively. Their pressure against the line 4 is, as is mentioned, suitably adapted by springs. The device may of course be fitted with several different, here not shown sensors, and may also be equipped for remote control or more direct control, according to demand. The measurement pair of tongs may be placed optionally within or outside of the wheels

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**Patent claims**

A device for the automatic control of joints (5) in electrical high voltage lines, comprising a first support (1) a first wheel (2) for lying on a line (4), a driving means for driving of said first wheel (2), at least one second wheel (3) for lying on said line(4), a measurement unit (11) in contact with means for the measurement of physical data at said joint, comprising at least one pointed element (7,8,9) for electrical contact with the line (4),

characterized in that

at least one wheel (2,3) is provided, electrically connected to said measurement unit (11).

2.

A device according to claim 1,

characterized in that

at least two wheels (2,3) are electrically connected to said measurement unit (11), whereas a means for feeding current is provided to feed an electrical current from the first wheel (2) to the second wheel (3) through the line (4).

3.

A device according to claim 1,

characterized in that

the means for measurement of physical data in the form of at least one pointed element (7,8,9) also comprises at least one wheel (2,3).

4.

A device according to any of claims 1 to 3,

characterized in that

it comprises a holder on (15), journaled in the support (1), intended to be swung up below the line (4) to increase the pressure of the wheel (2,3) against same.

5.

A device according to any of claims 1 to 4,

characterized in that

measure position givers (16,17) preferably in the form of laser distance gauges are provided for measurement of the position of the device in relationship to the actual joint (5).

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